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Emotion, Engineering and Ethics

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1. CHANGE

Engineering is about change. Engineers play a part in designing new things, maintaining and operating things; they rectify faults and help regulate infrastructures.

Change brings benefits but can cause harm and introduce costs. An engineer's task is to guide change and to evaluate it. This evaluation can be wide ranging and consider energy use, material use and disposal, visual impact, the potential users and their foibles, reliability, cost, safety, impact on health as well as the technical aspects of construction, configuration and delivery. Additionally engineers must ensure their proposals satisfy regulations, laws, standards and the constraints of company policy and public expectations.

Broadly engineers ensure constructions behave inoffensively, reliably, safely and as specified. Often this requires much deliberation and discussion.

2. ECONOMY

To reduce biases and uncertainties in discussions, engineers employ techniques common to science. However there are limitations on resources, personal and physical energy and limits to the authority, locations and schedules of individuals. Available theories are bounded and disconnected. There are limits to what an individual engineer can absorb and to the attention others pay. Consequently, everybody has a personal archipelago of understandings, influences and goals. Within a engineering enterprise these personal economies stimulate differences of opinion that arouse frustration, anger, anxiety, elation, pride and so on, emotions which are quickened by clashes of loyalty to an enterprise, nations, humankind, animal kind, the public, family, colleagues and friends.

My intention is to explain how these emotions affect engineers and therefore warrant explicit attention.

3. EMOTIONS

Emotions, according to Martha Nussbaum, are “responses to... areas of vulnerability...in which we register the damages we have suffered, might suffer, or luckily have failed to suffer” [1, p.6]. They relate to people and things not fully under our control [2]. For instance, Nussbaum [1, p.13] presents fear as a burden imposed by “imagined bad possibilities”, and anger as a response to damage to someone or something we are attached to — perhaps our self-esteem [3] or our reputation; joy is aroused when we learn bad possibilities may not happen.

Nussbaum takes her lead from the Stoics who saw passions not as bestial impulses, but as evaluative thoughts telling us about what we construe as significant damage hence what we value.

The snag is, Nussbaum claims, emotions are unreliable indicators with unreliability arising from false beliefs about the dangers we face or from disproportionate reactions to threats.

The Stoics wanted to suppress emotions. Instead Nussbaum wants to recognize the contributions emotions make to our knowledge. For engineers this translates into a requirement to integrate experiences of emotions into engineering judgments.

Others too have hinted that emotions have a useful cognitive role. Allan Janik [4] noted that the enlightenment had an often forgotten theme summed up by David Hume when he famously wrote “reason is and ought to be the slave of the passions” [5, p.295]. However Pitcher [6] criticized Hume for his “traditional view” which parades emotions as sensations and inner feelings. Pitcher proposed adding processes of apprehension and evaluation though Solomon, who listed the aspects of emotions as behavioral, physiological, phenomenological, cognitive and contextual, claimed it would be a mistake to overstress the cognitive aspect of emotion [7, p.13]. Crucially though Solomon acknowledged emotions involve a system of judgments, beliefs and desires and a context that includes imagination and memory [8] and presuppositions [3].

4. JUDGEMENT

Within the rigid frameworks of engineering there is freedom, and while calculations guide choice, some factors are immeasurable or unknowable therefore inexpressible in any calculus. Even where there are well-defined rules, the rules can come into conflict. These conflicts and areas of ignorance render logical reasoning impotent but, irrespective of logical flaws, judgments are necessary to move a project forward.

Ultimately in an engineering project judgments interpolate between rules, what is known or incommensurate and here emotions offer guidance; as Nussbaum [2] explains emotions are forms of judgment. For those things that are uncertain, unfamiliar or rough-hewn, emotions guide by revealing the value we attribute to objects like materials, theories, instruments and documents, opinions, assertions, assumptions and the people that express them.

Emotional judgments are typically spontaneous and unarticulated [3]. Scrutinizing and rationalizing the emotional experience is the kind of reflection that will likely bring a sense of proportion and adjustments that enable otherwise unreliable, ill-defined emotions to contribute constructively to an engineering debate. Such conscious examination potentially reveals a previously neglected evaluative dimension.

An individual's emotion may have relevance to a wider community. The emotion can denote harms and through its intensity offer a starting point for assessing the significance of the object of the emotion in a wider debate. But the emotional experience is only useful to an engineering enterprise if the emotion's cognitive content is externalized.

5. REASONABLENESS

Any judgment about engineered change can be labeled reasonable or unreasonable thus a legitimate subject for criticism, but especially judgments implied in emotions which are vulnerable to misinterpretation and self-deceit [8].

An engineering judgment that leads to harm may be considered reasonable because it prevents a worse harm. A judgment will be considered unreasonable when it is considered baseless, irrational, exaggerated or rooted in confusion between coincidence and cause.

In all these cases there is a normative element thus the assessment of reasonableness is itself the result of a judgment, which arouses supportive or confounding emotions that reflect thoughts about, for instance, the reasonableness of caring about vulnerable things or of controlling another person's actions — matters which are commonly elements of ethical debates.

6. EMPATHY

For an engineering project the emotions of obvious relevance are those triggered by a proposal for an engineered artefact that has the potential to cause or extinguish harm. Any artifact or engineering proposal can arouse emotional reactions, from users, bystanders or engineering colleagues, but for the engineer the awareness of possible damage arises mainly through being a knowledgeable observer.

The outward signs of an emotion can be tactically feigned or exaggerated. Accounts of emotions can be imprecise, or distorted. Furthermore, the engineer will have difficulty gauging from an emotional response what matters to the users or bystanders because of differences between the engineer and users or bystanders in location, psychology, culture, gender, ethnic group, age and so on. Worse, engineers might think of themselves "as like the self-sufficient gods...as people who believe themselves above the vicissitudes of life...inflict[ing]... miseries that they culpably fail to comprehend." [1, p.7]. Engineers require awareness and skill to benefit from observations of people's emotional responses.

7. PERSUASION

People have to be persuaded a project is worthwhile if it is to proceed. Reasons have to be constructed and there is a set of words, Rorty [9] explains, we "carry about" to justify our actions and beliefs; where these words fail we can only resort to emotional displays or provocation, or as Rorty colorfully puts it "beyond them is only helpless passivity or a resort to force".

Where there is little common vocabulary, an engineer can exploit displays of emotion to impress on others how much he or she values things or can guide an audience towards discoveries about what they value by stirring their emotions.

Exaggerated claims of harm or benefit are effective rhetorical devices that awaken emotions. Socrates was critical: he acknowledged rhetoric convinces, but asserted it does not "educate people, about matters of right and wrong" [10, §455a]. He classified rhetoric alongside "flattery" requiring a "natural talent for interacting with people" [10, §463].

Nussbaum [1] warns of such exploitation of emotional provocations directed at the character by giving examples commonly related to punishments — shame and disgust. The harm alluded to in such provocations relate to something

personal and, occasionally, mythical or otherwise undeniable. Such emotions can be compelling but also disquieting, disabling, disruptive and even harmful. For instance, threats to sever personal attachments are coercive emotional provocations which hamper engineers who are fearful of the harm to their relationships with colleagues posed by any criticisms of engineering proposals.

Consciously inflicted emotional harms are not always considered unreasonable for instance in doctrines justifying self-defense. There are then a catalogue of emotions that can usefully drive a project forward but the object of some of those emotions are harms to individuals and this adds another ethical dimension to engineering enterprises.

8. CONCLUSION

Adopting Nussbaum's view provides grounds for recognizing those bursts of anger or delight and the responses to them that alter the course of development of engineering projects. Her case supports the view that our emotions offer authentic thoughts about authentic situations, and by ignoring emotions our judgments are liable to be deficient. At worst, without reflection an emotion hides an influential unarticulated and mistaken belief. But at best an emotion can be taken to be an indicator of relevant components of ethical arguments supporting an engineering project and the significance attributed to them.

So we might expect virtuous engineers to be aware of their emotions, of ways in which they exploit the emotions of others, to reflect on those emotions and to use the knowledge gained in their judgments. To be effective within this emotional soup they will have to be self-aware, articulate, persuasive and above all empathetic.

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